

Remarks/Arguments

Favorable consideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 3, 4, and 11 are pending in the application, with Claims 3 and 11 amended by the present amendment.

In the outstanding Office Action, Claims 3-4 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee et al. (U.S. Patent No. 6,288,493) in view of Holland et al. (U.S. Patent No. 5,800,619); and Claims 3-4 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ishii et al. (U.S. Patent No. 5,571,366) in view of Holland et al.

Applicants acknowledge with appreciation the personal interview between the Examiner and Applicants' representative on February 19, 2004. During the interview, it was discovered that Applicants' amendment of October 29, 2003 had not been placed in the file and, thus, the outstanding rejection was based on the claims presented in Applicants' amendment of October 23, 2003. At the Examiner's suggestion, a signed copy of Applicants' amendment of October 29, 2003, along with a copy of the original filing receipt, was filed on February 20, 2004.

Also during the interview, the Examiner acknowledged that none of the cited references appeared to disclose Applicants' claimed parallel coils, but that further review of the cited references was required to confirm this finding. Furthermore, the Examiner suggested amending Claims 3 and 11 to more clearly describe and distinctly claim Applicants' invention in view of Applicants' Figure 8.

Claims 3 and 11 are amended as suggested by the Examiner during the interview. Support for this amendment is found in Applicants' Figure 8. No new matter is added.

Briefly recapitulating, Claim 3 is directed to a power supply antenna, comprising: at least two coils disposed concentrically. The at least two coils comprise a plurality of conductors bent into a form of an arc, and power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source. The power supply portions are located in different phases on a common plane. The power supply antenna also includes another coil disposed on a plane parallel to the common plane and configured to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted. By placing at least coil in a parallel plane, heating distribution of the plasma can be shaped to achieve a uniform absorption distribution and/or intensification.¹

Ishii discloses an antenna comprising divisional antennas and designed to decrease plasma density in the central portion of the antenna and uniformize plasma density in the radial direction as compared with a spiral coil.² However, as noted in the Official Action, Ishii does not disclose or suggest a coil disposed on a plane parallel to a common plane and configured to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted, as recited in Applicants' amended Claims 3 and 11.

Lee discloses an antenna device with two coaxial coil antennas. However, as noted in the Official Action, Lee does not disclose or suggest a coil disposed on a plane parallel to a common plane and configured to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted, as recited in Applicants' amended Claims 3 and 11.

Holland discloses an "electric source [including a] substantially planar coil 24, usually mounted immediately above window 19"³ and alternative embodiments that include

¹ Specification, page 26, lines 13-20.

² Ishii, abstract.

³ Holland, column 7, lines 2-8.

“positioning the coils... in many different planes above window 19.”⁴ However, Holland does not disclose or suggest that “at least one of the coils is disposed on a plane parallel to the same plane” as recited in Applicants’ Claims 3 and 11. Applicants also note that Holland discloses that the antenna structure of Holland generates a non-uniform component is generated in the plasma within the chamber 10 mounted in a direction parallel to the dielectric window 19.⁵ Thus, Holland states that the most uniform plasma is generated when the inclination angle between the coil plane and the window 19 is set at about 9 to 18 degrees.⁶ However, with Applicants’ claimed “at least one of the coils...disposed on a plane parallel to the same plane,” the nonuniform component of Holland is not generated. Thus, with Applicants’ claimed invention, there is no need to provide a coil inclination to maintain plasma stability.

Holland also does not disclose that the coil on the parallel plane “is configured to vary mutual inductances so that a distribution of energy absorbed to a plasma is adjusted” as recited in Applicants’ Claim 3. In Applicants’ invention, the respective coils are arranged parallel to one another, where the vertical distance L between the coils can be adjusted to vary mutual inductances so that the distribution of energy absorbed to the plasma is adjusted. By being able to vary mutual inductances (by adjusting a distance L between the coils), an optimum energy distribution can be obtained in an improved and easy-to-control manner. Additionally, antenna coils are generally made of a hard material, such as a copper pipe. Thus, once the antenna coil is produced, it is virtually impossible to change its physical characteristics (e.g., diameter). However, with the claimed invention, desired adjustments

⁴ Holland, column 14, lines 11-24.

⁵ Holland, column 13, lines 10-20

⁶ Holland, column 13, lines 21-45; Figure 10.

can be made by changing the height position of a predetermined coil. In contrast, conventional systems like Holland are unable to vary mutual inductances.

Because none of the cited prior art, individually or in combination, disclose or suggest all the elements of independent Claims 1 and 11, Applicants submit the inventions defined by Claims 1 and 11, and all claims depending therefrom, are not rendered obvious by the asserted prior art for at least the reasons stated above.⁷

Accordingly, in view of the present amendment and in light of the previous discussion, Applicants respectfully submit that the present application is in condition for allowance and respectfully request an early and favorable action to that effect.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599
Michael E. Monaco
Registration No. 52,041

Customer Number
22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM/MEM/kkn

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⁷ MPEP § 2142 "...the prior art reference (or references when combined) must disclose or suggest all the claim limitations. The disclosing or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."